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Certificate Information

The following Ada implementation was tested and determined to pass ACVC 1.11. Testing was completed on 3 October 1990.

Compiler Name and Version:	Tolerant Ada Development System, Version 6.0
Host Computer System:	Tolerant Eternity TX, 5.4.0
Target Computer System:	Tolerant Eternity TX, 5.4.0
Customer Agreement Number:	90-07-25-SWL

See Section 3.1 for any additional information about the testing environment.

As a result of this validation effort, Validation Certificate 901003W1.11039 is awarded to Software Leverage, Inc. This certificate expires on 1 March 1993.

This report has been reviewed and is approved.

Steven P. Wilson
Ada Validation Facility
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Washington DC 20301

AVF Control Number: AVF-VSR-400.0491
1 April 1991
90-07-25-SWL

Ada COMPILER
VALIDATION SUMMARY REPORT:
Certificate Number: 901003W1.11039
Software Leverage, Inc.
Tolerant Ada Development System, Version 6.0
Tolerant Eternity => Tolerant Eternity

Prepared By:
Ada Validation Facility
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Alexandria VA 22311

Ada Joint Program Office
Dr. John Solomond, Director
Department of Defense
Washington DC 20301

DECLARATION OF CONFORMANCE

The following declaration of conformance was supplied by the customer.

Declaration of Conformance

Customer: Software Leverage, Inc.

Certificate Awardee: R. M. Hilleary, E-Systems/ECI Division

Ada Validation Facility: ASD/SCEL, Wright-Patterson AFB OH 45433-6503

ACVC Version: 1.11

Ada Implementation:

Ada Compiler Name and Version: Tolerant Ada Development System, Version 6.0

Host Computer System: Tolerant Eternity TX, 5.4.0

Target Computer System: Tolerant Eternity TX, 5.4.0

Declaration:

We, the undersigned, declare that we have no knowledge of deliberate deviations from the Ada Language Standard ANSI/MIL-STD-1815A ISO 8652-1987 in the implementation listed above.

Date: 10/2/90

Mike Gilbert, President
Software Leverage, Inc.

Date: 10/3/90

R. M. Hilleary, Sr. Subcontract Administrator
E-Systems, Inc., ECI Division

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CHAPTER 1

INTRODUCTION

The Ada implementation described above was tested according to the Ada Validation Procedures [Pro90] against the Ada Standard [Ada83] using the current Ada Compiler Validation Capability (ACVC). This Validation Summary Report (VSR) gives an account of the testing of this Ada implementation. For any technical terms used in this report, the reader is referred to [Pro90]. A detailed description of the ACVC may be found in the current ACVC User's Guide [UG89].

1.1 USE OF THIS VALIDATION SUMMARY REPORT

Consistent with the national laws of the originating country, the Ada Certification Body may make full and free public disclosure of this report. In the United States, this is provided in accordance with the "Freedom of Information Act" (5 U.S.C. #552). The results of this validation apply only to the computers, operating systems, and compiler versions identified in this report.

The organizations represented on the signature page of this report do not represent or warrant that all statements set forth in this report are accurate and complete, or that the subject implementation has no nonconformities to the Ada Standard other than those presented. Copies of this report are available to the public from the AVF which performed this validation or from:

National Technical Information Service
5285 Port Royal Road
Springfield VA 22161

Questions regarding this report or the validation test results should be directed to the AVF which performed this validation or to:

Ada Validation Organization
Institute for Defense Analyses
1801 North Beauregard Street
Alexandria VA 22311

1.2 REFERENCES

[Ada83] Reference Manual for the Ada Programming Language, ANSI/MIL-STD-1815A, February 1983 and ISO 8652-1987.

[Pro90] Ada Compiler Validation Procedures, Version 2.1, Ada Joint Program Office, August 1990.

[UG89] Ada Compiler Validation Capability User's Guide, 21 June 1989.

1.3 ACVC TEST CLASSES

Compliance of Ada implementations is tested by means of the ACVC. The ACVC contains a collection of test programs structured into six test classes: A, B, C, D, E, and L. The first letter of a test name identifies the class to which it belongs. Class A, C, D, and E tests are executable. Class B and class L tests are expected to produce errors at compile time and link time, respectively.

The executable tests are written in a self-checking manner and produce a PASSED, FAILED, or NOT APPLICABLE message indicating the result when they are executed. Three Ada library units, the packages REPORT and SPPRT13, and the procedure CHECK_FILE are used for this purpose. The package REPORT also provides a set of identity functions used to defeat some compiler optimizations allowed by the Ada Standard that would circumvent a test objective. The package SPPRT13 is used by many tests for Chapter 13 of the Ada Standard. The procedure CHECK_FILE is used to check the contents of text files written by some of the Class C tests for Chapter 14 of the Ada Standard. The operation of REPORT and CHECK_FILE is checked by a set of executable tests. If these units are not operating correctly, validation testing is discontinued.

Class B tests check that a compiler detects illegal language usage. Class B tests are not executable. Each test in this class is compiled and the resulting compilation listing is examined to verify that all violations of the Ada Standard are detected. Some of the class B tests contain legal Ada code which must not be flagged illegal by the compiler. This behavior is also verified.

Class L tests check that an Ada implementation correctly detects violation of the Ada Standard involving multiple, separately compiled units. Errors are expected at link time, and execution is attempted.

In some tests of the ACVC, certain macro strings have to be replaced by implementation-specific values -- for example, the largest integer. A list of the values used for this implementation is provided in Appendix A. In addition to these anticipated test modifications, additional changes may be required to remove unforeseen conflicts between the tests and implementation-dependent characteristics. The modifications required for this implementation are described in section 2.3.

For each Ada implementation, a customized test suite is produced by the AVF. This customization consists of making the modifications described in the preceding paragraph, removing withdrawn tests (see section 2.1) and, possibly some inapplicable tests (see Section 2.2 and [UG89]).

In order to pass an ACVC an Ada implementation must process each test of the customized test suite according to the Ada Standard.

1.4 DEFINITION OF TERMS

Ada Compiler	The software and any needed hardware that have to be added to a given host and target computer system to allow transformation of Ada programs into executable form and execution thereof.
Ada Compiler Validation Capability (ACVC)	The means for testing compliance of Ada implementations, consisting of the test suite, the support programs, the ACVC user's guide and the template for the validation summary report.
Ada Implementation	An Ada compiler with its host computer system and its target computer system.
Ada Joint Program Office (AJPO)	The part of the certification body which provides policy and guidance for the Ada certification system.
Ada Validation Facility (AVF)	The part of the certification body which carries out the procedures required to establish the compliance of an Ada implementation.
Ada Validation Organization (AVO)	The part of the certification body that provides technical guidance for operations of the Ada certification system.
Compliance of an Ada Implementation	The ability of the implementation to pass an ACVC version.
Computer System	A functional unit, consisting of one or more computers and associated software, that uses common storage for all or part of a program and also for all or part of the data necessary for the execution of the program; executes user-written or user-designated programs; performs user-designated data manipulation, including arithmetic operations and logic operations; and that can execute programs that modify themselves during execution. A computer system may be a stand-alone unit or may consist of several inter-connected units.

Conformity	Fulfillment by a product, process or service of all requirements specified.
Customer	An individual or corporate entity who enters into an agreement with an AVF which specifies the terms and conditions for AVF services (of any kind) to be performed.
Declaration of Conformance	A formal statement from a customer assuring that conformity is realized or attainable on the Ada implementation for which validation status is realized.
Host Computer System	A computer system where Ada source programs are transformed into executable form.
Inapplicable test	A test that contains one or more test objectives found to be irrelevant for the given Ada implementation.
ISO	International Organization for Standardization.
System	provides services such as resource allocation, scheduling, input/output control, and data management. Usually, operating systems are predominantly software, but partial or complete hardware implementations are possible.
Target Computer System	A computer system where the executable form of Ada programs are executed.
Validated Ada Compiler	The compiler of a validated Ada implementation.
Validated Ada Implementation	An Ada implementation that has been validated successfully either by AVF testing or by registration [Pro90].
Validation	The process of checking the conformity of an Ada compiler to the Ada programming language and of issuing a certificate for this implementation.
Withdrawn test	A test found to be incorrect and not used in conformity testing. A test may be incorrect because it has an invalid test objective, fails to meet its test objective, or contains erroneous or illegal use of the Ada programming language.

CHAPTER 2

IMPLEMENTATION DEPENDENCIES

2.1 WITHDRAWN TESTS

The following tests have been withdrawn by the AVO. The rationale for withdrawing each test is available from either the AVO or the AVF. The publication date for this list of withdrawn tests is 02 September 1990.

E28005C	B28006C	C34006D	B41308B	C43004A	C45114A
C45346A	C45612B	C45651A	C46022A	B49008A	A74006A
B83022B	B83022H	B83025B	B83025D	B83026A	C83026B
C83041A	B85001L	C97116A	C98003B	BA2011A	CB7001A
CB7001B	CB7004A	CC1223A	BC1226A	CC1226B	BC3009B
BD1B02B	BD1B06A	AD1B08A	BD2A02A	CD2A21E	CD2A23E
CD2A32A	CD2A41A	CD2A41E	CD2A87A	CD2B15C	BD3006A
CD4022A	CD4022D	CD4024B	CD4024C	CD4024D	CD4031A
CD4051D	CD5111A	CD7004C	ED7005D	CD7005E	AD7006A
CD7006E	AD7201A	AD7201E	CD7204B	BD8002A	BD8004C
CD9005A	CD9005B	CDA201E	CE2107I	CE2119B	CE2205B
CE2405A	CE3111C	CE3118A	CE3411B	CE3412B	CE3812A
CE3814A	CE3902B				

2.2 INAPPLICABLE TESTS

A test is inapplicable if it contains test objectives which are irrelevant for a given Ada implementation. Reasons for a test's inapplicability may be supported by documents issued by ISO and the AJPO known as Ada Commentaries and commonly referenced in the format AI-ddddd. For this implementation, the following tests were determined to be inapplicable for the reasons indicated; references to Approved Ada Commentaries are included as appropriate.

The following 201 tests have floating-point type declarations requiring more digits than SYSTEM.MAX_DIGITS:

C24113L..Y (14 tests)	C35705L..Y (14 tests)
C35706L..Y (14 tests)	C35707L..Y (14 tests)
C35708L..Y (14 tests)	C35802L..Z (15 tests)
C45241L..Y (14 tests)	C45321L..Y (14 tests)
C45421L..Y (14 tests)	C45521L..Z (15 tests)
C45524L..Z (15 tests)	C45621L..Z (15 tests)
C45641L..Y (14 tests)	C46012L..Z (15 tests)

The following 21 tests check for the predefined type LONG_INTEGER:

C35404C	C45231C	C45304C	C45411C	C45412C
C45502C	C45503C	C45504C	C45504F	C45611C
C45612C	C45613C	C45614C	C45631C	C45632C
B52004D	C55B07A	B55B09C	B86001W	C86006C
CD7101F				

C35702B, C35713C, B86001U, and C86006G check for the predefined type LONG_FLOAT.

C35713D and B86001Z check for a predefined floating-point type with a name other than FLOAT, LONG_FLOAT, or SHORT_FLOAT.

A35801E checks that FLOAT'FIRST..FLOAT'LAST may be used as a range constraint in a floating-point type declaration; for this implementation, that range exceeds the safe numbers and must be rejected. (See section 2.3)

C45531M..P (4 tests) and C45532M..P (4 tests) check fixed-point operations for types that require a SYSTEM.MAX_MANTISSA of 47 or greater.

C45624A..B (2 tests) check that the proper exception is raised if MACHINE_OVERFLOWS is FALSE for floating point types; for this implementation, MACHINE_OVERFLOWS is TRUE.

C86001F recompiles package SYSTEM, making package TEXT_IO, and hence package REPORT, obsolete. For this implementation, the package TEXT_IO is dependent upon package SYSTEM.

B86001Y checks for a predefined fixed-point type other than DURATION.

C96005B checks for values of type DURATION'BASE that are outside the range of DURATION. There are no such values for this implementation.

CD1009C uses a representation clause specifying a non-default size for a floating-point type.

CD2A84A, CD2A84E, CD2A84I..J (2 tests), and CD2A840 use representation clauses specifying non-default sizes for access types.

The tests listed in the following table are not applicable because the given file operations are supported for the given combination of mode and file access method.

Test	File Operation	Mode	File Access Method
CE2102D	CREATE	IN_FILE	SEQUENTIAL_IO
CE2102E	CREATE	OUT_FILE	SEQUENTIAL_IO
CE2102F	CREATE	INOUT_FILE	DIRECT_IO
CE2102I	CREATE	IN_FILE	DIRECT_IO
CE2102J	CREATE	OUT_FILE	DIRECT_IO
CE2102N	OPEN	IN_FILE	SEQUENTIAL_IO
CE2102O	RESET	IN_FILE	SEQUENTIAL_IO
CE2102P	OPEN	OUT_FILE	SEQUENTIAL_IO
CE2102Q	RESET	OUT_FILE	SEQUENTIAL_IO
CE2102R	OPEN	INOUT_FILE	DIRECT_IO
CE2102S	RESET	INOUT_FILE	DIRECT_IO
CE2102T	OPEN	IN_FILE	DIRECT_IO
CE2102U	RESET	IN_FILE	DIRECT_IO
CE2102V	OPEN	OUT_FILE	DIRECT_IO
CE2102W	RESET	OUT_FILE	DIRECT_IO
CE3102E	CREATE	IN_FILE	TEXT_IO
CE3102F	RESET	Any Mode	TEXT_IO
CE3102G	DELETE	--------	TEXT_IO
CE3102I	CREATE	OUT_FILE	TEXT_IO
CE3102J	OPEN	IN_FILE	TEXT_IO
CE3102K	OPEN	OUT_FILE	TEXT_IO

CE2203A checks that WRITE raises USE_ERROR if the capacity of the external file is exceeded for SEQUENTIAL_IO. This implementation does not restrict file capacity.

CE2403A checks that WRITE raises USE_ERROR if the capacity of the external file is exceeded for DIRECT_IO. This implementation does not restrict file capacity.

CE3304A checks that USE_ERROR is raised if a call to SET_LINE_LENGTH or SET_PAGE_LENGTH specifies a value that is inappropriate for the external file. This implementation does not have inappropriate values for either line length or page length.

CE3413B checks that PAGE raises LAYOUT_ERROR when the value of the page number exceeds COUNT'LAST. For this implementation, the value of COUNT'LAST is greater than 150000 making the checking of this objective impractical.

2.3 TEST MODIFICATIONS

Modifications (see section 1.3) were required for 20 tests.

IMPLEMENTATION DEPENDENCIES

The following tests were split into two or more tests because this implementation did not report the violations of the Ada Standard in the way expected by the original tests.

B24009A	B33001B	B38003A	B38003B	B38009A
B38009B	B85008G	B85008H	BC1303F	BC3005B
BD2B03A	BD2D03A	BD4003A		

A35801E was graded inapplicable by Evaluation Modification as directed by the AVO; the compiler rejects the use of the range FLOAT'FIRST..FLOAT'LAST as the range constraint of a floating-point type declaration because the bounds lie outside of the range of safe numbers (cf. ARM 3.5.7(12)).

CD1009A, CD1009I, CD1C03A, and CD2A31A..C (3 tests) use instantiations of the support procedure Length_Check, which uses Unchecked_Conversion according to the interpretation given in AI-00590. The AVO ruled that this interpretation is not binding under ACVC 1.11; the tests are ruled to be passed if they produce Failed messages only from the instantiations of Length_Check--i.e., the allowed Report.Failed messages have the general form:

" * CHECK ON REPRESENTATION FOR <TYPE_ID> FAILED."

CHAPTER 3

PROCESSING INFORMATION

3.1 TESTING ENVIRONMENT

The Ada implementation tested in this validation effort is described adequately by the information given in the initial pages of this report.

For a point of contact for technical information about this Ada implementation system, see:

Technical Support
485 Massachusetts Avenue
Arlington MA 02174
(617) 648-1414

For a point of contact for sales information about this Ada implementation system, see:

Sales Information
485 Massachusetts Avenue
Arlington MA 02174
(617) 648-1414

Testing of this Ada implementation was conducted at the customer's site by a validation team from the AVF.

3.2 SUMMARY OF TEST RESULTS

An Ada Implementation passes a given ACVC version if it processes each test of the customized test suite in accordance with the Ada Programming Language Standard, whether the test is applicable or inapplicable; otherwise, the Ada Implementation fails the ACVC [Pro90].

PROCESSING INFORMATION

For all processed tests (inapplicable and applicable), a result was obtained that conforms to the Ada Programming Language Standard.

Total Number of Applicable Tests	3823
Total Number of Withdrawn Tests	74
Processed Inapplicable Tests	72
Non-Processed I/O Tests	0
Non-Processed Floating-Point Precision Tests	201
Total Number of Inapplicable Tests	273
Total Number of Tests for ACVC 1.11	4170

The above number of I/O tests were not processed because this implementation does not support a file system. The above number of floating-point tests were not processed because they used floating-point precision exceeding that supported by the implementation. When this compiler was tested, the tests listed in section 2.1 had been withdrawn because of test errors.

3.3 TEST EXECUTION

Version 1.11 of the ACVC comprises 4170 tests. When this compiler was tested, the tests listed in section 2.1 had been withdrawn because of test errors. The AVF determined that 273 tests were inapplicable to this implementation. All inapplicable tests were processed during validation testing except for 201 executable tests that use floating-point precision exceeding that supported by the implementation. In addition, the modified tests mentioned in section 2.3 were also processed.

A magnetic tape containing the customized test suite (see section 1.3) was taken on-site by the validation team for processing. The contents of the magnetic tape were loaded directly onto the host computer. After the test files were loaded onto the host computer, the full set of tests was processed by the Ada implementation.

Testing was performed using command scripts provided by the customer and reviewed by the validation team. See Appendix B for a complete listing of the processing options for this implementation. It also indicates the default options. The options invoked explicitly for validation testing during this test were:

Switch	Effect
-el	Intersperse error messages with source text when there are warnings or errors at compile time.
-M	Cause the prelinker to be called if the compilation has no errors. (The -M option only affects compilations which had no compilation errors.)

Test output, compiler and linker listings, and job logs were captured on magnetic tape and archived at the AVF. The listings examined on-site by the validation team were also archived.

APPENDIX A

MACRO PARAMETERS

This appendix contains the macro parameters used for customizing the ACVC. The meaning and purpose of these parameters are explained in [UG89]. The parameter values are presented in two tables. The first table lists the values that are defined in terms of the maximum input-line length, which is the value for $MAX_IN_LEN--also listed here. These values are expressed here as Ada string aggregates, where "V" represents the maximum input-line length.

Macro Parameter	Macro Value
$BIG_ID1	(1..V-1 => 'A', V => '1')
$BIG_ID2	(1..V-1 => 'A', V => '2')
$BIG_ID3	(1..V/2 => 'A') & '3' & (1..V-1-V/2 => 'A')
$BIG_ID4	(1..V/2 => 'A') & '4' & (1..V-1-V/2 => 'A')
$BIG_INT_LIT	(1..V-3 => '0') & "298"
$BIG_REAL_LIT	(1..V-5 => '0') & "690.0"
$BIG_STRING1	'"' & (1..V/2 => 'A') & '"'
$BIG_STRING2	'"' & (1..V-1-V/2 => 'A') & '1' & '"'
$BLANKS	(1..V-20 => ' ')
$MAX_LEN_INT_BASED_LITERAL	"2:" & (1..V-5 => '0') & "11:"
$MAX_LEN_REAL_BASED_LITERAL	"16:" & (1..V-7 => '0') & "F.E:"
$MAX_STRING_LITERAL	'"' & (1..V-2 => 'A') & '"'

MACRO PARAMETERS

The following table lists all of the other macro parameters and their respective values.

Macro Parameter	Macro Value
$MAX_IN_LEN	499
$ACC_SIZE	32
$ALIGNMENT	4
$COUNT_LAST	2147483647
$DEFAULT_MEM_SIZE	16777216
$DEFAULT_STOR_UNIT	8
$DEFAULT_SYS_NAME	ETERNITY_TX
$DELTA_DOC	0.000000000465661287307739257812 5
$ENTRY_ADDRESS	SYSTEM."+"(16#40#)
$ENTRY_ADDRESS1	SYSTEM."+"(16#80#)
$ENTRY_ADDRESS2	SYSTEM."+"(16#100#)
$FIELD_LAST	2147483647
$FILE_TERMINATOR	' '
$FIXED_NAME	NO_SUCH_TYPE
$FLOAT_NAME	NO_SUCH_TYPE
$FORM_STRING	""
$FORM_STRING2	"CANNOT_RESTRICT_FILE_CAPACITY"
$GREATER_THAN_DURATION	100000.0
$GREATER_THAN_DURATION_BASE_LAST	10000000.0
$GREATER_THAN_FLOAT_BASE_LAST	1.8E+308
$GREATER_THAN_FLOAT_SAFE_LARGE	5.0E307

$GREATER_THAN_SHORT_FLOAT_SAFE_LARGE	9.0E37
$HIGH_PRIORITY	99
$ILLEGAL_EXTERNAL_FILE_NAME1	7illegal/file_name/2}]%2102c.dat
$ILLEGAL_EXTERNAL_FILE_NAME2	7illegal/file_name/CE2102c*.dat
$INAPPROPRIATE_LINE_LENGTH	-1
$INAPPROPRIATE_PAGE_LENGTH	-1
$INCLUDE_PRAGMA1	PRAGMA INCLUDE ("A28006D1.TXT")
$INCLUDE_PRAGMA2	PRAGMA INCLUDE ("B28006D1.TXT")
$INTEGER_FIRST	-2147483648
$INTEGER_LAST	2147483647
$INTEGER_LAST_PLUS_1	2147483648
$INTERFACE_LANGUAGE	C
$LESS_THAN_DURATION	-10000.0
$LESS_THAN_DURATION_BASE_FIRST	-10000000.0
$LINE_TERMINATOR	ASCII.LF
$LOW_PRIORITY	0
$MACHINE_CODE_STATEMENT	CODE_0'(OP => NOP);
$MACHINE_CODE_TYPE	CODE_0
$MANTISSA_DOC	31
$MAX_DIGITS	15
$MAX_INT	2147483647
$MAX_INT_PLUS_1	2147483648
$MIN_INT	-2147483648

MACRO PARAMETERS

$NAME	TINY_INTEGER
$NAME_LIST	ETERNITY_TX
$NAME_SPECIFICATION1	/net/archt/ACVC/1.11/run_area/ce/X2120A
$NAME_SPECIFICATION2	/net/archt/ACVC/1.11/run_area/ce/X2120B
$NAME_SPECIFICATION3	/net/archt/ACVC/1.11/run_area/ce/X3119A
$NEG_BASED_INT	16#FFFFFFFD#
$NEW_MEM_SIZE	16777216
$NEW_STOR_UNIT	8
$NEW_SYS_NAME	ETERNITY_TX
$PAGE_TERMINATOR	ASCII.LF & ASCII.FF
$RECORD_DEFINITION	RECORD SUBP: OPERAND; END RECORD;
$RECORD_NAME	CODE_0
$TASK_SIZE	32
$TASK_STORAGE_SIZE	1024
$TICK	0.01
$VARIABLE_ADDRESS	ADDRESS OF VARIABLE
$VARIABLE_ADDRESS1	ADDRESS OF VARIABLE1
$VARIABLE_ADDRESS2	ADDRESS OF VARIABLE2
$YOUR_PRAGMA	PASSIVE

APPENDIX B

COMPILATION SYSTEM OPTIONS

The compiler options of this Ada implementation, as described in this Appendix, are provided by the customer. Unless specifically noted otherwise, references in this appendix are to compiler documentation and not to this report.

COMPILER OPTIONS

The Ada compiler is invoked with the following syntax:

```
ada [options] [source_file]... [linker_options] [object_file.o]...
```

Possible options are:

-# identifier type value	define an identifier
-a file_name	treat file_name as an archive file
-d	analyze for dependencies only
-e	process errors using a.error
-E	"
-E file	"
-E directory	"
-el	"
-EL	"
-EL file	"
-EL directory	"
-ev	"
-K	keep generated IL
-L library_name	operate in library library_name
-lfile_abbreviation	use file_abbreviation at link time
-M unit_name	use unit_name as main unit
-M source_file	use the unit in source_file as main unit
-o executable_file	make executable_file the output file
-O[0-9]	invoke optimizer with n passes (default=4)

COMPILATION SYSTEM OPTIONS

-P	invoke preprocessor
-R VADS_library	recompile instantiations
-S	apply pragma suppress to compilation
-T	print timing statistics
-v	verbose
-w	suppress warnings

LINKER OPTIONS

The linker options of this Ada implementation, as described in this Appendix, are provided by the customer. Unless specifically noted otherwise, references in this appendix are to linker documentation and not to this report. The Ada prelinker is invoked with the following syntax:

```
a.ld [options] unit_name [ld_options]
```

Possible options are:

option name	function
-DX	debug memory overflow
-E unit_name	elaborate unit_name as early as possible
-F	print a list of dependent files
-L library_name	operate in VADS library library_name
-o executable_file	make executable_file the output file
-sh	display tool name
-U	print a list of dependent units
-v	print linker command
-V	print linker command, suppress link

APPENDIX C

APPENDIX F OF THE Ada STANDARD

The only allowed implementation dependencies correspond to implementation-dependent pragmas, to certain machine-dependent conventions as mentioned in Chapter 13 of the Ada Standard, and to certain allowed restrictions on representation clauses. The implementation-dependent characteristics of this Ada implementation, as described in this Appendix, are provided by the customer. Unless specifically noted otherwise, references in this Appendix are to compiler documentation and not to this report. Implementation-specific portions of the package STANDARD, which are not a part of Appendix F, are:

```
package STANDARD is

    ...

    type INTEGER is range -2147483648 .. 2147483647;

    type FLOAT is digits 15
         range -1.79769313486232E+308 .. 1.79769313486232E+308;

    type DURATION is delta 0.001 range -2147483.648 .. 2147483.647;

    type SHORT_INTEGER is range -32768 .. 32767;

    type SHORT_FLOAT is digits 6
         range -3.40282E+38 .. 3.40282E+38;

    type TINY_INTEGER is range -128 .. 127;

    ...

end STANDARD;
```

APPENDIX F. Implementation-Dependent Characteristics

1. Implementation-Dependent Pragmas

INLINE_ONLY Pragma

The INLINE_ONLY pragma, when used in the same way as pragma INLINE, indicates to the compiler that the subprogram must always be inlined. This pragma also suppresses the generation of a callable version of the routine, which saves code space.

BUILT_IN Pragma

The BUILT_IN pragma is used in the implementation of some predefined Ada packages, but provides no user access. It is used only to implement code bodies for which no actual Ada body can be provided, for example the MACHINE_CODE package.

SHARE_CODE Pragma

The SHARE_CODE pragma takes the name of a generic instantiation or a generic unit as the first argument and one of the identifiers TRUE or FALSE as the second argument. This pragma is only allowed immediately at the place of a declarative item in a declarative part or package specification, or after a library unit in a compilation, but before any subsequent compilation unit.

When the first argument is a generic unit, the pragma applies to all instantiations of that generic. When the first argument is the name of a generic instantiation, the pragma applies only to the specified instantiation or overloaded instantiations.

If the second argument is TRUE, the compiler will try to share code generated for a generic instantiation with code generated for other instantiations of the same generic. When the second argument is FALSE, each instantiation will get a unique copy of the generated code. The extent to which code is shared between instantiations depends on this pragma and the kind of generic formal parameters declared for the generic unit.

The name pragma SHARE_BODY is also recognized by the implementation and has the same effect as SHARE_CODE. It is included for compatibility with earlier versions of VADS.

NO_IMAGE Pragma

The pragma suppresses the generation of the image array used for the IMAGE attribute of enumeration types. This eliminates the overhead required to store the array in the executable image.

EXTERNAL_NAME Pragma

The EXTERNAL_NAME pragma takes the name of a subprogram or variable defined in Ada and allows the user to specify a different external name that may be used to reference the entity from other languages. The pragma is allowed at the place of a declarative item in a package specification and must apply to an object declared earlier in the same package specification.

INTERFACE_OBJECT Pragma

The INTERFACE_OBJECT pragma takes the name of a a variable defined in another language and allows it to be referenced directly in Ada. The pragma will replace all occurrences of the variable name with an external reference to the second, link_argument. The pragma is allowed at the place of a declarative item in a package specification and must apply to an object declared earlier in the same package specification. The object must be declared as a scalar or an access type. The object cannot be any of the following:

a loop variable,
a constant,
an initialized variable,
an array, or
a record.

IMPLICIT_CODE Pragma

Takes one of the identifiers ON or OFF as the single argument. This pragma is only allowed within a machine code procedure. It specifies that implicit code generated by the compiler be allowed or disallowed. A warning is issued if OFF is used and any implicit code needs to be generated. The default is ON.

2. Implementation of Predefined Pragmas

CONTROLLED

This pragma is recognized by the implementation but has no effect.

ELABORATE

This pragma is implemented as described in Appendix B of the Ada RM.

INLINE

This pragma is implemented as described in Appendix B of the Ada RM.

INTERFACE

This pragma supports calls to 'C' and FORTRAN functions. The Ada subprograms can be either functions or procedures. The types of parameters and the result type for functions must be scalar, access, or the predefined type ADDRESS in SYSTEM. An optional third argument overrides the default link name. All

parameters must have mode IN. Record and array objects can be passed by reference using the ADDRESS attribute.

LIST

This pragma is implemented as described in Appendix B of the Ada RM.

MEMORY_SIZE

This pragma is recognized by the implementation. The implementation does not allow SYSTEM to be modified by means of pragmas; the SYSTEM package must be recompiled.

NON_REENTRANT

This pragma takes one argument which can be the name of either a library subprogram or a subprogram declared immediately within a library package spec or body. It indicates to the compiler that the subprogram will not be called recursively allowing the compiler to perform specific optimizations. The pragma can be applied to a subprogram or a set of overloaded subprograms within a package spec or package body.

NOT_ELABORATED

This pragma can only appear in a library package specification. It indicates that the package will not be elaborated because it is either part of the RTS, a configuration package, or an Ada package that is referenced from a language other than Ada. The presence of this pragma suppresses the generation of elaboration code and issues warnings if elaboration code is required.

OPTIMIZE

This pragma is recognized by the implementation but has no effect.

PACK

This pragma will cause the compiler to choose a non-aligned representation for composite types. It will not cause objects to be packed at the bit level.

PAGE

This pragma is implemented as described in Appendix B of the Ada RM.

PASSIVE

The pragma has three forms:

```
PRAGMA PASSIVE;
PRAGMA PASSIVE(SEMAPHORE);
PRAGMA PASSIVE(INTERRUPT, <number>);
```

This pragma Pragma passive can be applied to a task or task type declared

immediately within a library package spec or body. The pragma directs the compiler to optimize certain tasking operations. It is possible that the statements in a task body will prevent the intended optimization; in these cases, a warning will be generated at compile time and will raise TASKING_ERROR at runtime.

PRIORITY

This pragma is implemented as described in Appendix B of the Ada RM.

SHARED

This pragma is recognized by the implementation but has no effect.

STORAGE_UNIT

This pragma is recognized by the implementation. The implementation does not allow SYSTEM to be modified by means of pragmas; the SYSTEM package must be recompiled.

SUPPRESS

This pragma is implemented as described, except that RANGE_CHECK and DIVISION_CHECK cannot be suppressed.

SYSTEM_NAME

This pragma is recognized by the implementation. The implementation does not allow SYSTEM to be modified by means of pragmas, the SYSTEM package must be recompiled.

3. Implementation-Dependent Attributes

P'REF

For a prefix that denotes an object, a program unit, a label, or an entry, this attribute denotes the effective address of the first of the storage units allocated to P.

For a subprogram, package, task unit, or label, it refers to the address of the machine code associated with the corresponding body or statement. For an entry for which an address clause has been given, it refers to the corresponding hardware interrupt. The attribute is of the type OPERAND defined in the package MACHINE_CODE. The attribute is only allowed within a machine code procedure.

4. Specification Of Package SYSTEM

```
with UNSIGNED_TYPES;
package SYSTEM is
```

```
        pragma SUPPRESS(ALL_CHECKS);
        pragma SUPPRESS(EXCEPTION_TABLES);
        pragma SUPPRESS(NOT_ELABORATED);

        type NAME is ( eternity_tx );

        SYSTEM_NAME             : constant NAME := eternity_tx;

        STORAGE_UNIT    : constant := 8;
        MEMORY_SIZE             : constant := 16_777_216;

        -- System-Dependent Named Numbers

        MIN_INT                 : constant := -2_147_483_647 - 1;
        MAX_INT                 : constant := 2_147_483_647;
        MAX_DIGITS              : constant := 15;
        MAX_MANTISSA            : constant := 31;
        FINE_DELTA              : constant := 2.0**(-31);
        TICK                    : constant := 0.01;

        -- Other System-dependent Declarations

        subtype PRIORITY is INTEGER range 0 .. 99;

        MAX_REC_SIZE : integer := 64*1024;

        type ADDRESS is private;

        function ">" (A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function "<" (A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function ">="(A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function "<="(A: ADDRESS; B: ADDRESS) return BOOLEAN;
        function "-" (A: ADDRESS; B: ADDRESS) return INTEGER;
        function "+" (A: ADDRESS; I: INTEGER) return ADDRESS;
        function "-" (A: ADDRESS; I: INTEGER) return ADDRESS;

        function "+" (I: UNSIGNED_TYPES.UNSIGNED_INTEGER) return ADDRESS;

        function MEMORY_ADDRESS
                (I: UNSIGNED_TYPES.UNSIGNED_INTEGER) return ADDRESS renames "+";

        NO_ADDR : constant ADDRESS;

        type TASK_ID is private;
        NO_TASK_ID : constant TASK_ID;

        type PROGRAM_ID is private;
        NO_PROGRAM_ID : constant PROGRAM_ID;

private

        type ADDRESS is new UNSIGNED_TYPZS.UNSIGNED_INTEGER;
```

```
        NO_ADDR : constant ADDRESS := 0;

        pragma BUILT_IN(">");
        pragma BUILT_IN("<");
        pragma BUILT_IN(">=");
        pragma BUILT_IN("<=");
        pragma BUILT_IN("-");
        pragma BUILT_IN("+");

        type TASK_ID is new UNSIGNED_TYPES.UNSIGNED_INTEGER;
        NO_TASK_ID : constant TASK_ID := 0;

        type PROGRAM_ID is new UNSIGNED_TYPES.UNSIGNED_INTEGER;
        NO_PROGRAM_ID : constant PROGRAM_ID := 0;

end SYSTEM;
```

5. Restrictions On Representation Clauses

Pragma PACK

In the absence of pragma PACK, record components are padded to provide for efficient access by the target hardware; pragma PACK applied to a record eliminates the padding where possible. Pragma PACK has no other effect on the storage allocated for record components; a record representation is required.

Record Representation Clauses

For scalar types, a representation clause will pack to the number of bits required to represent the range of the subtype. A record representation applied to a composite type will not cause the object to be packed to fit in the space required. An explicit representation clause must be given for the component type. An error will be issued if there is insufficient space allocated.

Address Clauses

Address clauses are supported for variables and constants.

Interrupts

Interrupt entries are not supported.

Representation Attributes

The ADDRESS attribute is not supported for the following entities:

- Packages
- Tasks
- Labels
- Entries

Machine Code Insertions

Machine code insertions are supported.

The general definition of the package MACHINE_CODE provides an assembly language interface for the target machine. It provides the necessary record type(s) needed in the code statement, an enumeration type of all the opcode mnemonics, a set of register definitions, and a set of addressing mode functions.

The general syntax of a machine code statement is as follows:

```
CODE_n'( opcode, operand {, operand} );
```

where n indicates the number of operands in the aggregate.

A special case arises for a variable number of operands. The operands are listed within a subaggregate. The format is:

```
CODE_N'( opcode, (operand {, operand}) );
```

For those opcodes that require no operands, named notation must be used (cf. RM 4.3(4)).

```
CODE_0'( op => opcode );
```

The opcode must be an enumeration literal (i.e., it cannot be an object, attribute, or a rename).

An operand can only be an entity defined in MACHINE_CODE or the 'REF attribute.

The arguments to any of the functions defined in MACHINE_CODE must be static expressions, string literals, or the functions defined in MACHINE_CODE. The 'REF attribute may not be used as an argument in any of these functions.

Inline expansion of machine code procedures is supported.

6. Conventions for Implementation-Generated Names

There are no implementation-generated names.

7. Interpretation of Expressions in Address Clauses

Address clauses are supported for constants and variables.

8. Restrictions on Unchecked Conversions

None.

9. Restrictions on Unchecked Deallocations

None.

10. Implementation Characteristics of I/O Packages

Instantiations of DIRECT_IO use the value MAX_REC_SIZE as the record size (expressed in STORAGE_UNITS) when the size of ELEMENT_TYPE exceeds that value. For example, for unconstrained arrays such as string, where ELEMENT_TYPE'SIZE is very large, MAX_REC_SIZE is used instead. MAX_RECORD_SIZE is defined in SYSTEM and can be changed by a program before instantiating DIRECT_IO to provide an upper limit on the record size. In any case, the maximum size supported is 1024 x 1024 x STORAGE_UNIT bits. DIRECT_IO will raise USE_ERROR if MAX_REC_SIZE exceeds this absolute limit.

Instantiations of SEQUENTIAL_IO use the value MAX_REC_SIZE as the record size (expressed in STORAGE_UNITS) when the size of ELEMENT_TYPE exceeds that value. For example, for unconstrained arrays such as string, where ELEMENT_TYPE'SIZE is very large, MAX_REC_SIZE is used instead. MAX_RECORD_SIZE is defined in SYSTEM and can be changed by a program before instantiating INTEGER_IO to provide an upper limit on the record size. SEQUENTIAL_IO imposes no limit on MAX_REC_SIZE.

11. Implementation Limits

The following limits are actually enforced by the implementation. It is not intended to imply that resources up to or even near these limits are available to every program.

Line Length

The implementation supports a maximum line length of 500 characters including the end of line character.

Record and Array Sizes

The maximum size of a statically sized array type is 4,000,000 x STORAGE_UNITS. The maximum size of a statically sized record type is 4,000,000 x STORAGE_UNITS. A record type or array type declaration that exceeds these limits will generate a warning message.

Default Stack Size for Tasks

In the absence of an explicit STORAGE_SIZE length specification, every task except the main program is allocated a fixed size stack of 10,240 STORAGE_UNITS. This is the value returned by T'STORAGE_SIZE for a task type T.

Default Collection Size

In the absence of an explicit STORAGE_SIZE length attribute, the default collection size for an access type is 100 times the size of the designated

type. This is the value returned by T'STORAGE_SIZE for an access type T.

Limit on Declared Objects

There is an absolute limit of 6,000,000 x STORAGE_UNITS for objects declared statically within a compilation unit. If this value is exceeded, the compiler will terminate the compilation of the unit with a FATAL error message.